

THE VETERINARY MAGAZINE

A JOURNAL FOR THE PRACTITIONER, AND FOR THE ADVANCEMENT
OF COMPARATIVE MEDICINE.

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THE VETERINARY MAGAZINE.

VOL. II.

JULY, 1895.

No. 7.

ON THE ANATOMY OF TWO DISTOME PARASITES OF FRESHWATER FISH.

By W. G. MACCALLUM, B. A.
Johns Hopkins Medical School.

Distomum isoporum, Looss var. *armatum*.

Among the trematode parasites of fish, there is a series of distomes which are evidently very closely related, possessing many characteristic features in common, such as the relations of the suckers, the form of the intestines, the position and arrangement of the genital and secretory organs, etc. Still there are points of distinction and several species have been described, but until the descriptions of all such forms are collected and carefully compared, there must remain some obscurity as to their exact relations to one another. This series includes *distomum album* of Stossica (*a*) and *D. isoporum* of Looss (*b*) (Fig. 8), with certain others less minutely described. Having considered these forms, I have concluded that the one I am about to describe as most closely related to Looss's *D. isoporum*, and may best be classed as a variety of that species and named accordingly.

The demonstration of this relation may perhaps be best effected by a rather full description of the form and a comparison with the classical description of *D. isoporum* in Looss's monograph, with the help of figures.

The small intestine of *aplodmotus grunniens* forms the chief habitat of this worm, although it is also, though less commonly, found in the intestine of *lepisomis gibbonus* and *accepenser rubicundus*.

These fish all occur commonly in the waters of Lake Erie and the Grand River of Ontario, and it was from specimens obtained there in the summer of 1892 and 1893 that the material for these observations was procured.

One new method of preparing specimens for study may, perhaps, be mentioned here. It was as follows : Kill the worm in glacial acetic acid and leave it there for from five to ten minutes ; remove it thence directly into aqueous alum cochineal or alum carmine solution for one-half to one minute ; wash in water and mount in water, ringing the coverslip with Canada balsam or gold size. Specimens prepared in this way, although at first exceptionally brilliant and showing most advantageously many points in the anatomy, are not very permanent and become clouded on long standing.

The size in adults averages 3-4 by 1.2-1.5 mm. Color, whitish or yellowish white.

The anterior sucker is subterminal ; the acetabulum is situated about one-third the body length behind this, and is of about twice its diameter. This last relation, together with the presence of cuticular spines directly to be described, distinguish it to a certain extent from the *D. isoporum* of Looss.

The skin is armed with small spines, which are easily detachable. These are variable in size and frequency of occurrence in different regions of the body, being largest where the skin is thickest, immediately behind the acetabulum. Though less frequent there, the spines seem, generally speaking, larger posteriorly ; they are most closely distributed in the antero-ventral regions. They are conical, and either straight, or simply, or doubly curved. (Fig. 1a.)

In the anterior sucker, at the point of union of the pre-pharynx with the cavity of the sucker, there is a strong sphincter muscle of several thickened fibres. In both suckers there is an extensive development of connective tissue between the fibres, giving the appearance of a network. The large cells characteristic of the distome sucker are also to be seen.

The course of the fibres in the acetabulum may be noted. Externally (Fig. 2), fibres radiate backward from a point in the median line anteriorly, curving forward again to end, in the lip and in front of this region the fibres run in an arcuate

direction, not passing through the point. Below this layer are seen the radial fibres which make up the bulk of the musculature.

On the inner surface (Fig. 3) are two sets of fibres, one radiating to the posterior third of the greatest circumference of the cavity, from a line drawn from the centre of the lining of the cavity to the median point of its anterior boundary. From the posterior circumference, these fibres turning back, run to the lip or margin of the sucker. The other set, which, with this set, makes up the lining layer, is made of fibres which have both their origin and insertion in the inner margin of the lips of the cavity. They run thence (Fig. 3), outward and backward to the great circumference of the cavity, turn up on its roof and run in an arcuate course, with the convexity of the arc forward, to the opposite side, where they again turn to the lower wall of the cavity, forward and inward to its lip or margin. The region of origin and insertion of these fibres occupies but a small part of the lip margin on each side, anterior to the region of insertion of the other set of internal fibres.

There is nothing remarkable in the arrangement of the body muscles. They are well developed, especially the two layers of diagonal fibres in the skin musculature.

The parenchyma appears as a connective tissue network with scattered nuclei, corresponding, probably, with Lang's third modification (*c*), or Walter's *Typus IV* (*d*).

The prepharynx is dilated and sac-like ; the dorsal wall being most elongated, the dilation is dorso-ventral. This is described also in *D. hepaticum*, *D. lorum*, *D. hians*, etc.

The pharynx is well developed and provided with radial dilator muscles. The oesophagus is quite short—about the length of the pharynx in which point again it differs from Looss's *D. isoporum* ; although, of course, such a point of distinction would be of slight weight alone. The intestinal corca which extend quite to the posterior end of the body are furnished with a well-developed musculature of longitudinal and ring fibres. The intestinal epithelium, which takes the place of the lining cuticle at the point of bifurcation of the alimentary tract, consists of cells with clear protoplasm and large nuclei, which stain deeply—the cells are variable in form, some being club-shaped, with the nucleus situated in the swollen portion—in others, the nucleus is near the basement membrane. Many

of the cells are seen to be distended by a large droplet of clear fluid, probably resembling mucus; others contain fat globules which are seen on treating with osmic acid.

The topography of the excretory system is rather simple (Fig. 1). The tortuous lateral trunks, dilated at the level of the bifurcation of the oesophagus where they give off a recurrent branch, run posteriorly into a medium excretory reservoir which opens by a terminal aperture: at the point of entrance into this reservoir a small branch is given off to the posterior end of the body. At the level of the pharynx the lateral trunks, tapering gradually, double on themselves and run back to end in capillary ramifications terminated by narrow ciliated funnels. The nervous ganglia are connected by a commissure which runs dorsal to the prepharynx. Four branches or trunks are given off on each side—one to the pharynx, one to the mouth sucker and adjacent parts, one to the lateral regions of the body, and one main trunk to the organs lying behind (Fig. 1).

The testes are large and rounded and situated in the median line, the left one being anterior (Fig. 1). The vasa efferentia are thin walled, and, running ventral to the ducts of the female-generative apparatus, remain separate to their entrance into an elongated thin-walled vesicula seminalis, which is generally filled with spermatozoa. From the neck of this club-shaped vesicle there arises the muscular "pars prostatica," which is surrounded by large ovoid nucleated cells—the unicellular glands of the hematode "prostate." This tube is sharply marked off from the vesicle and runs downward to open on the ventral surface directly in front of the acetabulum. (cf. *D. isoporum*, where the opening is some way in front of it). At about the level of the centre of the acetabulum it is joined by the uterus, and from this point may be considered as a cloacal invagination. There is thus no true penis (cf. *D. album* where there is an armed penis) and the proximal portion of the muscular tube must alone act as bulbus ejaculatorius.

The disposition of the female genital organs is almost identical with that found in *D. isoporum*. (Figs. 1, 4 and 8).

The ovary is situated on the right side and behind the acetabulum and is quite ventral. The oviduct from this meets the duct from a large receptaculum seminis at a point whence Laurer's canal is given off to open in the median line of the

dorsal surface; from this point also there runs a duct to meet a short tube from the yolk reservoir (formed at the juncture of the two cross ducts of the vitellarium or yolk gland), and from this point of union starts the uterus, which runs with a few coils to the level of the acetabulum, where it suddenly narrows to a slender tube which opens into the cloacal tube referred to above, immediately beyond the muscular ejaculatory organ.

The receptaculum seminis is dorsal and anterior to the ovary from which the oviduct runs in a dorsal arching direction. The cross ducts from the yolk gland are also quite dorsal, and the yolk reservoir, which is ventral to this gives, off a tube which after arching in a dorsal direction curves down into the ootyph, or more properly that part of the uterus corresponding to the ootyph of monogenes.

The ovary is rounded, containing large fusiform ova, and the oviduct is rather short, and though it is narrow where it leaves the ovary and where it joins the other ducts, there is a thick walled dilatation in the middle of its course. During life spermatozoa were seen in this dilatation, as well as in the connected ducts, suggesting that fertilization may take place there.

The receptaculum seminis is large and club-shaped with thin walls provided with ring musculature, which is best developed round the neck. It is almost invariably filled with spermatozoa in adult worms. Laurer's canal is well developed in this form—the walls possess a weak ring musculature, though no special development is seen about the circular opening. The lumen generally contains spermatozoa.

The duct formed by the union of these three runs backward and a little downward to the curving duct from the yolk reservoir which is ventral to the cross duct from the yolk gland. This yolk duct, which is quite narrow, widens considerably to form the reservoir referred to above. The yolk gland consists of large lobules filling up a great part of the posterior end of the body, extending forward to the level of the ovary. In the hyaline-walled lobules are seen the small formative cells, with dense cell contents and large nuclei. Transition stages are also seen passing into the fully developed yolk cell with large nucleus, still seen with nuclear stains, and hyaline cell contents, containing numerous yellow-brown yolk grains. Twelve to twenty of these cells are included with one ovum to form each egg.

The duct from the yolk reservoir, after receiving the other combined ducts, widens into a spherical "ootyp," separated from the uterus proper by a constriction. The lining of this "eibildungsraum" consists of a sort of cylinder epithelium with large nuclei. The margin of these cells bordering on the lumen has a ragged appearance, and the whole cell contents are markedly granular. The wall is also penetrated by the numerous ducts from a mass of elongated nucleated cells, disposed radially round the ootyp, which appear to constitute a shell gland.

The shells of the eggs which after leaving the ootyp become brown and unstainable are quite thick. The rest of the uterus is wide and thin-walled as far as the construction referred to above, which it reaches after making from two to five coils or folds. This constricted portion has rather thicker walls, but is very much narrower, so that the lumen is greatly reduced in calibre.

The lemon-shaped eggs are few in number, sometimes as many as seventy, but reach a comparatively large size, 100-110 μ by 60-70 μ .

It will thus be seen that the main points of difference between this form and its type form are as follows :

1. The armature of spines.
2. The relative length of the oesophagus.
3. The histological structure of the acetabulum which, though no special structure is mentioned in Looss's description, is so evidently peculiar that I feel inclined to think it is not identical with that of *D. isoporum*.
4. The position of the genital opening.
5. The relation of the uterine opening to that of the male apparatus and the formation of a cloacal tube.
6. The general structure of the male ejaculatory apparatus.

Taking all these into consideration, together with the general extreme similarity of the two forms, it seems to me that the most desirable position of the worm is expressed by the name *Distomum isoporum*, Looss, var. *armatum*, MacCallum.

Distomum lobotes, nov. sp.

Habitat. Intestine of *anguilla chrysopa* (rectal portion), and of *perca flavescens* and *stegostedion vitreum* (duodenal portion).

Small delicate worms, 1-3 mm. in length, color white, the numerous brown eggs showing through the skin. The eggs are so numerous and the development of vitellarium so great that the most satisfactory results were gained by a study of sections.

The mouth sucker is subterminal; the acetabulum, whose diameter is greater by about one-half, is situated about one-third the body length behind this. Both suckers show a very considerable development of interfibrillar connective tissue with numerous nucleated deeply staining cells. There is in both a delicate inner and outer circular muscle fibre layer, though in the acetabulum this is incomplete on the outer side, and in both there is developed on the inner and outer sides of the margins of the lips a ring of thick muscle fibres forming a sort of sphincter. This weakness of the sucker corresponds with the passive habits of life of these worms.

The prepharynx is short but dilated and pouch-like. The pharynx shows the same structure as the suckers—radial and inner circular musculature with much connective tissue and large cells. The oesophagus is rather long and divides into two simple ceca, which run back to the level of the ovary—about half the length of the body. It is surrounded by deeply staining cells.

The thick lining cuticle extends a short distance into the intestinal ceca, where it is replaced by the intestinal epithelium. This consists of deeply staining cubical nucleated cells with a clear border. There is no musculature, and the intestinal walls are therefore very thin and delicate.

The cuticle is quite thick and somewhat granular in the deeper portion. It is unarmed. The cuticular glands are numerous and stain deeply. Much larger gland cells with small nuclei and faintly staining granular cytoplasm occur frequently in the head region—more sparsely elsewhere. These probably correspond to the *kopfdrüsen* of authors.

The body musculature is delicate as compared with that of the preceding form, but four layers are present, the longitudinal fibres being best developed. The parenchyma muscles are very fine and sparsely distributed. Fibres radiate from the lips of the acetabulum to the body walls, forming a sort of rosette.

The parenchyma probably corresponds to the Walters typus III (d) or Leuckart's *blasenzellen*, where the definite nucleated

cells contain large vacuoles, although here the cell contents appear to occupy more of the cell than a mere marginal zone.

The nervous system consists in two large ganglia, placed at the sides of the pharynx with a suprapharyngeal commissure and five branches on each side. The ganglia are surrounded by chromatophile cells and contain very large nerve cells. The nerve trunks are as follows (vide Fig. 6)—two posterior nerves, running back to the organs in the posterior part of the body; of these the ventral is the larger and gives off a nerve to the margin of the body. There are also two anterior nerves, of which one runs to the anterior extremity of the body and to adjacent parts, the other directly to the anterior sucker. The remaining nerve; which runs to the margin of the body, gives off several branches to the body wall from one side of its trunk.

Dark-brown pigment spots, situated on the dorsal surface of the body on each side at the level of the forking of the intestine, probably function as eye spots, and from their position are probably in connection with the dorsal posterior nerves.

The excretory system is greatly developed—a fusiform vesicle extends from the terminal posterior opening forward about one-fourth the length of the body (vide Fig. 5), dividing there it gives rise to two large lateral trunks which extend to the anterior extremity of the body. In life this is generally filled with a fluid in which float innumerable spherical or disciform concretions. These are very highly refractive, and dissolve in acetic acid.

The collecting tubules are narrow and short, and apparently empty into the lateral trunks throughout their extent.

The testes are small and rounded or oval. They are placed laterally behind the level of the ovary. There is nothing of note in their structure. The *vasa efferentia* unite to form a *vas deferens*, a short distance from their point of entrance into an elongated thin-walled sac, which runs near the median line in front of the sucker forward nearly to the level of the forking of the intestine; here it turns on itself and runs back, soon becoming suddenly constricted into a very narrow tube which runs with several coils to a thick-walled conical *bulbus ejaculatorius*, which opens at a point immediately in front of the acetabulum together with the uterus. The elongated sac or seminal vesicle is provided with longitudinal and ring musculature.

The ovary in this form is extensively lobed (whence the name) the lobules being in connection with a central one or sinus from which the oviduct arises (vide Figs. 5 and 7). The fully developed ova are seen in this sinus, whither they arrive from the outlying lobules. The cytoplasm of these ova is comparatively small in quantity, and near the oviduct it becomes, relatively to the size of the nucleus, so small that the nucleus is affected by the pressure and becomes slightly polygonal. The oviduct is a straight, narrow tube, which runs vertically upward, receiving in its course a duct from the yolk reservoir. At its upper extremity it receives Laurer's canal and the duct from the receptaculum seminis, and gives off the uterus which runs again to the ventral surface. From this it will be seen that the ovary and uterus are quite ventral, the receptaculum and vitellarium dorsal. The vitellarium is a lobulated gland disposed in the antero-lateral portion of the body, extending back as far as the level of the testes. The asini are so connected as to give it a tubular appearance to a certain extent. The cross ducts dip downward to form in the middle at their union the yolk reservoir, from which a duct joins the oviduct. The yolk cells are small, polyhedral, and nucleated, the whole cell body being filled with yellow yolk granules.

Laurer's canal and the receptaculum seminis which open into the oviduct are both delicately formed, and provided with but slight, if any, musculature. The uterus arising from the point of junction of these ducts is at first narrow and is not definitely marked off into an ootyph and uterus proper as in the previous form. The epithelial lining of this part, however, is quite thick, and the wall is here penetrated by the ducts from a large mass of club-shaped nucleated granular cells which form the shell gland. The development of this gland is extreme, and there is a corresponding thickness and opacity in the shells of the eggs.

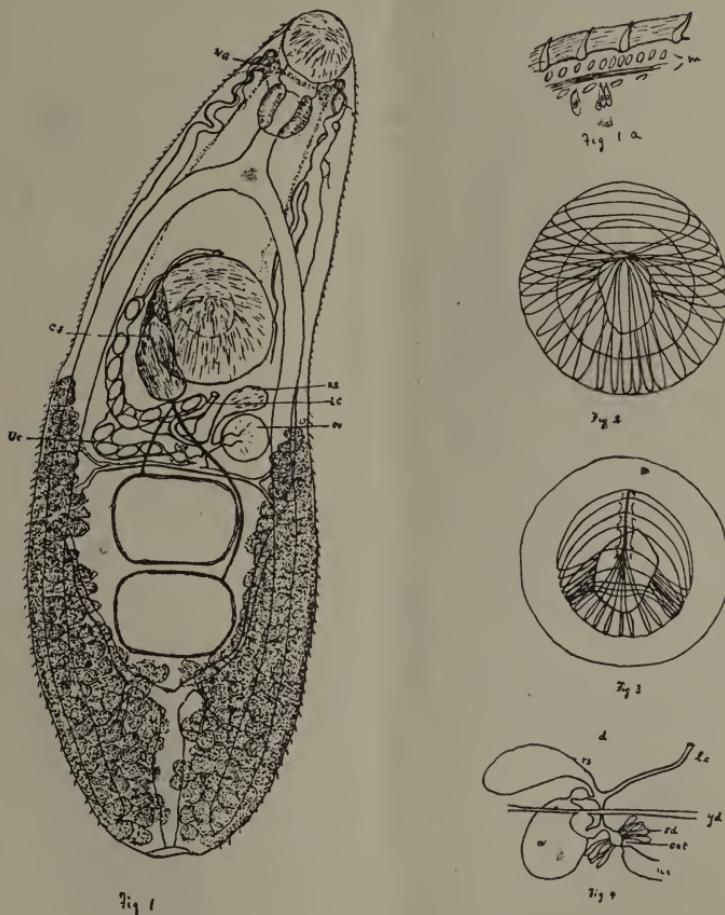
The uterus proper widens into a thin walled tube, which runs with many convolutions about the hinder portion of the body and, passing to the left of the acetabulum, opens with the bulbus ejaculatorius in the genital atrium immediately in front of the acetabulum. The eggs are very numerous, small, 32.5 by 15 μ , and pear shaped, with thick, brown shell.

Mention may here be made of the recurrence of *distomum nodulosum* in the intestines of *amblophites rupestris*, *anguilla*

chrysopa, lepomis pallidus, aplodinotus, accipenser rubicundus and *micropterus salmoides*, also of the occurrence of *distomum opacum*, Ward, in the stomach of *anguilla chrysopa*.

LITERATURE.

- (a) STROSSICH—Brani de Elmintologia Tergestima. 7.
- (b) LOOSS—*Distomum isoporum* is described, with numerous figures, in Looss's "Monograph on the Trematode Parasites of Fresh Water Fish," etc. Leipzig, 1893.
- (c) LANG—"Polycladen de Golfes von Neapel, u. s. w.: Fauna und Flora des Golfes von Neapel." Leipzig, 1884.
- (d) WALTER—"Untersuch. über den Bau d. Trematoden." *Z. f. wiss. Zool.* 56. Bd., 1893, p. 211.



EXPLANATION OF PLATE.

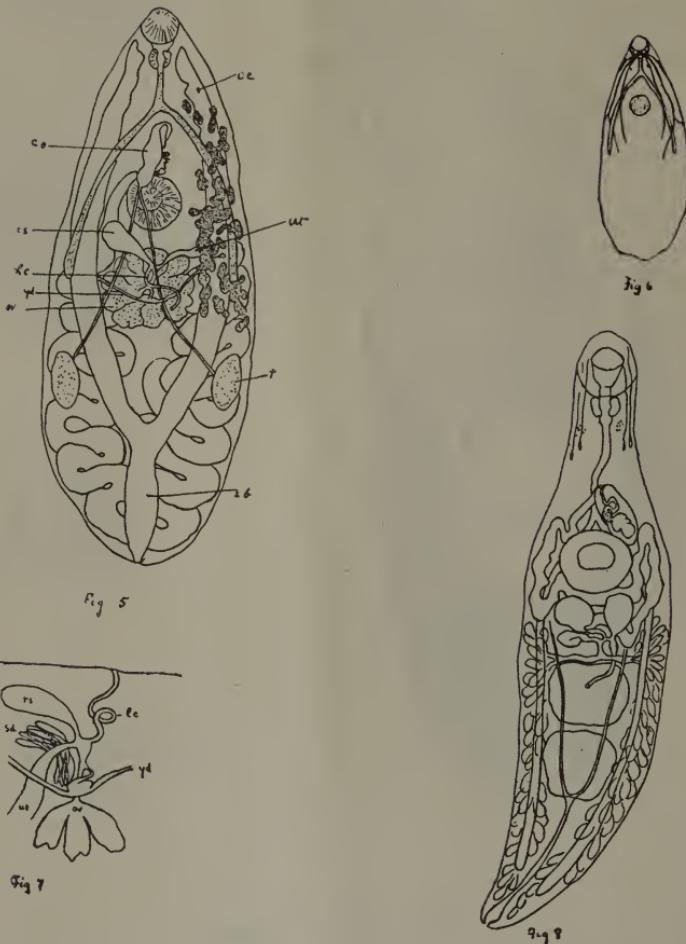
Fig. 1.—*Distomum isoporum*, var. *armatum*—dorsal view. N. G., Ganglion of nervous system; C. S., male ejaculatory apparatus; ut., uterus; ov., ovary; L. c., Laurer's canal; R. S., receptaculum seminis.

Fig. 1a.—Section of cuticle, etc., showing spines; m., body musculature.

Fig. 2.—Dorsal view of acetabulum.

Fig. 3.—Ventral view of acetabulum.

Fig. 4.—Female genital organs from posterior side—d., dorsal side; s. d., shell gland; oot., ootype; other letters as in Fig. 1.



EXPLANATION OF PLATE.

Fig. 5.—*Distomum lobotes*, nov. sp.—dorsal view. o. c., ocelli; y. d., yolk duct; t., testes; e. b., excretory vesicle; other letters as in Fig. 1.

Fig. 6.—Diagram of nervous system.

Fig. 7.—Diagram of female genital organs; letters as in Fig. 4.

Fig. 8.—Sketch of *Distomum isoporum*, Looss (from Looss).

MATERIA MEDICA AND THERAPEUTICS.

By E. STANTON MUIR, PH. G., V. M. D.,
Instructor in Comparative Materia Medica and Pharmacy, University of
Pennsylvania.

[Continued.]

BELLADONNA.

Official preparations.—Of the leaves. *Extractum belladonnae foliorum alcoholicum* (solid extract). Prepared by exhausting ground belladonna leaves with a menstruum composed of two parts alcohol and one part water, and evaporating the percolate to a pilular consistence.

Tinctura belladonnae foliorum (tincture). Exhaust 150 gm. of ground belladonna leaves with sufficient diluted alcohol to make 1000 c. c.

Of the Root.—*Extractum belladonnae radicis fluidum* (fluid extract). This preparation is made by percolating ground belladonna root with a hydro-alcoholic menstruum (four parts alcohol to one part water); when finished is of such strength that each 1000 c. c. of the finished preparation represents the strength of 1000 gm. of the drug used.

Atropine.—Process previously given.

Doses.—*Dried leaves.* Horses, 25 to 50 gm.; cattle, 40 to 75 gm.; dogs, .33 to .66 gm.

Extract.—Horses, 2 to 10 gm.; cattle, 5 to 15 gm.; dogs, .033 to .13 gm.

Atropine sulphate.—Horses, .033 to .1 gm.; dogs, .0005 to .002 gm. Hypodermic dose of the alkaloidal salt is one-fifth to one-fourth the doses given above.

STRAMONII FOLIA.

Stramonium leaves.—Synonyms. Thorn apple, Jamestown weed, Jimson weed.

Natural Order.—Solanaceæ. *Habitat.*—Asia. Found growing wild in most all countries.

Description.—Leaves of *datura stramonium*, gathered after the plant has come in flower. This plant is found in all parts

of our country, and is at once valuable as a medicinal agent and a pest to the agriculturist on account of the time and trouble it takes to eradicate it from a farm after it once scatters its seeds over the soil. There are two varieties of stramonium which, however, have the same therapeutic actions. One variety has a green stem and bears a white bell-shaped flower; the other variety has a dark red stem dotted with green spots and bears the same bell-shaped flower, which is of a purple color, with darker purple stripes inside the corolla. The plant usually grows to the height of about one metre, has an erect smooth stem which branches at the top. The flowers are solitary, bell-shaped, with a long tube, and end in five pointed teeth. The leaves are petiolate, about .15 meter long, ovate in shape, with an irregularly toothed or sinuate margin. The odor of the recent leaf is fetid and narcotic, which is partially lost in drying. The taste is unpleasant, bitter and nauseous. The leaves contain a small percentage of an alkaloid termed *daturine*, which has been found to be a mixture of *atropine* and *hyoscamine*; they also contain gum, resin, extractive matter, beside other substances of little importance. Water, alcohol or hydroalcoholic menstrua extract the virtue of the leaves.

STRAMONII SEMEN.

Description.—The seeds of *datura stramonium* which are fully matured. The capsule of stramonium is four-celled and contains numerous small seeds, attached to a longitudinal receptacle in the centre of each cell; it is about .036 meter long, rather ovate in shape and is covered with short, sharp, spines. The seeds are about .004 meter long, kidney-shaped, of a dark-brown or blackish color. Externally, pitted and wrinkled. The testa covers a creamy white, oily albumen, in which is embedded the curved embryo. The seeds have little or no odor, except when bruised, when the peculiar heavy narcotic odor of the leaves is noticeable. The seeds are probably four or five times more active than the leaves. They contain 0.3 per cent of *daturine*, besides 25 per cent of a fixed oil, resin, mucilage, etc.

Therapeutic Actions.—Narcotic, antispasmodic, midriatic, diuretic, poisonous.

Therapeutics.—The indications for the use of stramonium are identical with those of belladonna and *hyoscyamus*. The

poisonous symptoms produced by stramonium cannot be told from those caused by belladonna and hyoscyamus. In poisoning by any one of these three drugs, death is produced by paralysis of the brain and of the centres in the medulla and spinal cord, causing delirium and irregular movements, followed by asphyxia, paralysis of respiration. Therapeutically what has been said of belladonna can be said of stramonium (Vide). There is, however, one disease where the latter drug is of especial value, that is in the *spasms of asthma*. In this disease the powdered leaves are burnt and the smoke inhaled.

Official Preparations.—*Of the seeds.* *Extractum stramonii seminis* (solid extract), prepared by percolating the powdered seeds with diluted alcohol and evaporating the percolate to the proper pilular consistency.

Extractum stramonii seminis fluidum (fluid extract). The powdered seeds are percolated with a menstruum, of alcohol, fifteen parts; water, five parts, and when finished is of the usual fluid extract strength, 1000 c. c. representing the virtue of 1000 gm. of crude drug used.

Tinctura stramonii seminis (tincture). One hundred and fifty grams of powdered seeds are exhausted by percolation, with sufficient diluted alcohol to make 1000 c. c. of tincture.

Doses.—*Dried leaves.* Horses, 25 to 50 gm.; cattle, 40 to 75 gm.; dogs, .33 to .66 gm.

Extract.—Horses, 2 to 10 gm.; cattle, 5 to 15 gm.; dogs, .033 to .13 gm.

The doses of the seeds should be from one-fourth to one-third those given for the leaves.

The alkaloid, daturine, is rarely, if ever used; it being identical with atropine, the latter alkaloid taking its place; the dose, however, is the same as that of atropine.

[To be continued.]

TRANSLATIONS.

NEURECTOMY: INDICATIONS AND CONTRA-
INDICATIONS.

BY FRICK.

[TRANSLATED BY JOHN W. ADAMS.]

The real value of neurectomy has not yet been accurately determined, if we may judge from the literature of the operation. While some authorities recommend it always, and with confidence, as a last resort in a number of lamenesses of the horse, there are others who concede it but a very limited sphere of usefulness, and never suggest it except as an ultimate, uncertain expedient. Which of these two estimates of the worth of neurectomy is more nearly correct can be decided only after careful consideration of the data furnished by each writer; unfortunately, however, most writers have neglected to describe fully the conditions present in their unsuccessful cases. As a rule, neurectomy is rated in accordance with its results; that is, he who has had good results praises the operation, while another who has had some bad results either condemns it, or what amounts to the same, hesitates to advise it. That success depends not only upon skill in operative technique, but also upon the proper meeting of certain requirements, is too well known to require discussion. However, I believe that by considering the indications and contra-indications for neurectomy more in detail, I can reconcile the widely differing opinions of certain writers as to the value of this operation, and quite accurately define the conditions which alone indicate it. I believe that I am all the better qualified to do this because I have had a great many unfavorable experiences following neurectomy, and undesirable terminations are of much greater value in stimulating investigation and explaining obscure conditions than are favorable results.

The philosophy of neurectomy may be stated as follows :

The most conspicuous act peculiar to any certain lameness, whether it occur during the movement of a limb or while the latter supports the body-weight is, as a rule, the manifestation of painful sensations in a diseased region. If these painful sensations are made impossible, the disturbance of function and usually the lameness ceases.

Removal of painful impressions may be effected :

1. By destroying the morbid processes that give rise to the pain, or
2. By stopping the nerve impulses at some point between the diseased peripheral region and the centres of consciousness in the brain.

Every therapist endeavors to cure lameness by allaying the diseased processes, employing the means at his command, as cold, irrigation, poultice, counter-irritation in form of blister or cautery. Yet, it cannot be denied that all these remedies are often insufficient to remove a lameness, in which case nothing can be done but to interrupt the passage of nerve impulses from the diseased tissues to the brain, where they are registered during consciousness as pain. This is accomplished by severing the sensitive nerves, which supply the diseased tissues, at some point on their course from these tissues to the brain ; and, in order to delay as long as possible the reunion of the ends of the cut nerve a piece of this nerve is cut out—excised (neurectomy).

Theoretically, every lameness can be treated and removed by neurectomy of the proper nerves of sensation. Practically, however, the case is somewhat otherwise, since no sensitive nerve is suitable for section unless the following anatomical conditions are present :

1. The nerve must be easy to find, have a superficial location, and
2. It must be capable of being isolated before it is cut ; that is, it must not be bound up with motor nerves, so that section of the nerve shall not destroy the function of certain groups of muscles.

It happens for these anatomical reasons and many other reasons which we will later consider under contra-indications, that in the horse there are but few sensitive nerves suitable for neurectomy, and among these the operation is confined almost

exclusively to the median or cubito-plantar and its terminal branches, the plantar and digital nerves of the fore leg, and to the great sciatic or femoro-popliteal and terminal branches of the hind leg.¹

Upon these nerves neurectomy is often performed for the most widely different lamenesses, and we now proceed to consider the indications for this operation.

Among lamenesses, for which in the past neurectomy has been most often done and even to-day is frequently recommended, the most conspicuous is chronic navicular arthritis. It was this disease that Sewell first successfully treated by neurectomy; since then many other diseases have been deprived of their power of doing harm through neurectomy as, for example, the different forms of ringbone, horn tumors (kerato- and keraphyllo-cele), contracted heels, ossification of lateral cartilages; and Professor Möller has, by neurectomy, successfully removed the lameness due to formation of the bony callus following fracture of the phalanges and even of the cannon bones.

A mere enumeration of the diseases which have been more or less satisfactorily treated by neurectomy shows that we have to deal with a definite group of lamenesses, namely with *chronic* lamenesses, unaccompanied by acute inflammatory symptoms. If we now call to mind the fact that all these diseases have at times been successfully treated by other methods, we may deduce the second indication for neurectomy.

The indications for neurectomy are therefore as follows :

A given lameness is suitable for treatment by neurectomy, when

1. The precited anatomical conditions respecting the sensitive nerves of the diseased area are present;
2. The lameness is determined by chronic disease, *i. e.*, the absence of every symptom of acute inflammation;
3. Every curative procedure, which ordinarily offers any prospect of success, has been tried and relinquished, and
4. No conditions are present which might jeopardize the success of the operation, or indeed give rise to any unfavorable complication, *i. e.* no contra-indications exist.

These few principles seem simple and self-evident enough to us to-day, but a few years ago this was by no means the case.

¹ In the further course of this article the term "neurectomy" will refer only to these nerves.

The history of neurectomy shows that many infractions have been made upon these precepts. For instance, F. Guenther attempted to cure spavin lameness by neurectomy of the femoro-popliteal (N. tibialis) nerve, although this nerve has nothing to do with sensation of the hock. That, also, the second rule (absence of symptoms indicating acute inflammation) has not always been observed, is shown by the cases reported by Rabouille, Monoyer, Fadeux and others. Though these cases ended in failure from a surgical standpoint, they were directly productive of much good by directing our attention to the fourth principle, namely, the contra-indications to the operation. Bad results first showed the true value of neurectomy—its percentage of successes and the conditions that presage its failure.

Results of neurectomy may be considered as of two kinds: those which are always produced (constant), and those which appear only under certain conditions (contingent). While the constant effects of neurectomy constitute a factor which can always be taken into account, and which does not interfere with locomotion of the animal, the contingent or accidental results are serious, because they usually appear unexpectedly, and interfere with the action of the limb, indeed, often permanently. A knowledge of these unfortunate terminations and their causes is therefore of the greatest importance to the surgeon, if he would avoid like results. Indeed, the exciting causes of certain unfavorable terminations are often so certain to appear, if not actually present, that they are to be regarded as contra-indications and given proper attention.

The constant results of neurectomy are:

1. Abolition of sensation in the portion of the limb supplied by the nerve.
2. Dilatation of blood-vessels of this region.

We do not, at present, know of any other direct and constant result of neurectomy; all other conditions which have been regarded as consequences of neurectomy are really indirect results of one or both of the above mentioned constant results.

Loss of sensation in the part, caused by section of the nerve, is the sole object of the operation; but that a number of deleterious conditions may be favored by this very absence of sensation we shall see later.

The dilatation of blood-vessels in a part supplied by a sensory nerve that has been severed has been demonstrated experimentally by Brauell, Schiff and others. A consequence of vascular dilatation is a more rapid nourishing of the tissues affected, and this hypernutrition is manifested by a more rapid growth of horn on the neurectomized foot, so that it requires trimming and shoeing more often than the other hoofs. It is quite rare, however, that this over-production of horn is so marked as to give rise to tuberous outgrowths from the region of the coronet (Möller). The quickened nutritive processes exert other and injurious influences upon the tendons and ligaments. I have had opportunity personally to observe that following a neurectomy tendons and ligaments lose their tenacity and firmness, become thicker, more watery, very vascular, while under normal conditions of health such peculiarities are never seen in these tissues. Since in such a condition there is an alteration of structure and a loss of strength of these tissues, we do not wonder that rupture of them frequently occurs under ordinary exertion. Yet in opposition to this theory the argument is sometimes advanced that these ruptures of tendinous and ligamentous structures do not occur after every neurectomy. To this I can only say that the hypernutrition merely produces a change in the region of vascular dilatation and that to this change or *causa interna* an external cause must be added in order to produce a rupture. Whenever the external cause (mechanical), namely, the stretching of the tendon under the weight of the body—for which the internal cause is responsible, acts with sufficient force, a rupture is sure to occur.

This question then naturally arises: what are the conditions that call for such a vigorous action on the part of the flexor apparatus as to cause the flexor perforans pedis to break, even then weakened by overnutrition? Most of the authorities are of the opinion that neurectomized horses use the "nerved" limb harder than the others, *i. e.*, bring it to the ground more forcibly and carelessly. Möller is the only one who disputes this, and he does so because he has neurectomized running horses with success.

Unfortunately, no investigations that would decide this question have ever been made, and that a neurectomized leg is used with less care than the others is, therefore, to a certain

extent, a theory which has been built upon subjective grounds. Nevertheless, a critical examination of the facts will throw some light on the actual state of affairs.

As is well known, the impact upon the flexor apparatus, of the body-weight when the foot is set to the ground, depends not only upon the weight and velocity (momentum) of the mass thus suddenly arrested, *i. e.*, not only upon the force with which the foot strikes the ground, but also upon the direction of the phalanges with relation to the cannon, and upon the nature of the ground surface—whether smooth or uneven, hard or soft.

Waiving consideration of the long, low, slanting fetlock, we must yet always take into account the action of the limb and the nature of the ground in measuring the strain of the impact. If we observe a neurectomized horse we cannot fail to see that it makes greater demands upon the flexor apparatus than before the operation, for the lameness that existed before section of the nerve was characterized by a sparing of the painful tissues and with them of the flexors of the limb. Whether, or not, after the operation the action of the limb and the accompanying impact received by the flexor apparatus exceed the normal for that animal cannot be determined at present because of lack of experimental evidence. The observation, that saddle horses after this operation have a hard, uneven gait in the affected limbs certainly seems to point to abnormally excessive action. Under certain conditions, which make greater demands upon the flexors of the limbs as, for instance, hard mountainous roads and high knee action, this excessive action may be regarded as normal, but yet is just as injurious. Be this as it may, in every case neurectomy causes an equal action in at least one of the sound limbs, and when this happens under the precited conditions, we must admit that the flexor tendons, weakened as a result of the operation, are unequal to the work required of them, *i. e.*, that the use of the leg is relatively too violent and inconsiderate.

There is also no doubt that the cause of rupture of the flexor tendons following neurectomy is largely mechanical, and is a logical sequence of want of feeling in the foot. However, it must be remembered that the mechanical factor alone does not cause rupture of the tendon, but that the latter, weakened by hypernutrition following the neurectomy, is predisposed

to rupture, and only gives way under excessive strain of the flexor apparatus upon hard, hilly roads, under heavy pulling and high knee action.

The fact, that rupture only exceptionally occurs immediately or shortly after neurectomy, but that usually there is at first a more or less gradual stretching of the tendon leading after a long time to rupture, certainly substantiates the correctness of the belief that the giving way of the tendon is dependent both on hypernutrition and excessive strain.

The proof of the correctness of this explanation is furnished by unsuccessful cases of my own, with which I have labored in my present professional territory. This territory is decidedly mountainous. The demands upon the strength of draft horses are so excessive, by reason of the roughness of the country and the lack of compassion in the greater part of the inhabitants, that animals that are not unusually strong of limb break down, or are otherwise badly crippled after two years of service. As a result, the very chronic inflammatory conditions which call for neurectomy (ringbone, spavin) are of daily experience. I have had, therefore, abundant opportunity to practice neurectomy, and I have availed myself of it. My results soon after the operation have been most gratifying, but in from one to one and one-half years following the operation I have had many ruptured tendons. This unfortunate termination, besides others, I have always experienced after neurectomy on heavy draft horses which have to draw heavy loads in the mountains. One of my many unsuccessful cases, which makes especially clear the influence of the mechanical factor in rupture of the tendon, I may here briefly describe :

A medium sized, East Prussian, bay gelding, driven to a light cab, and a very free traveler, ran away and sustained a fissure of the first phalanx of the left hind leg. With rest the fissure healed under a large bony callus in eight weeks. Although the animal placed weight on the limb and at a walk was only slightly lame, he was too lame to be used at a trot when hooked to the cab. My earlier unfortunate experiences had made me cautious, and I applied various blisters, but without success. Finally, about four months after the accident I decided to try neurectomy, and the owner consented. The operation was successfully performed, the animal traveled freely and sound for three months, and the end of which time

the fetlock began to sink owing to a gradual stretching of the perforans tendon. In four more weeks the tendon broke completely, and the horse was pronounced incurable and destroyed. The necropsy showed that the plantar aponeurosis (fanshaped widening of the flexor pedis perforans) was very thin, badly frayed, very vascular, filled with a serous exudate and torn from the semilunar crest of the pedal bone.

Another unfortunate result of neurectomy which has rendered many of my patients worthless, and which also Renner has drawn attention to, is the bruising of the tendons of the fore limbs by the hind feet ("speedy-cut"). Though I have not observed this result as frequently as I have rupture of the perforans tendon, yet, nevertheless, it is sufficiently frequent and serious to have its causes considered a contra-indication of neurectomy. While hypernutrition plays a certain rôle in diminishing the tenacity of the perforans tendon and inviting rupture, this factor is entirely wanting in bruise of the tendons from "speedy-cut." Renner has always, and I in my present territory have always divided the nerve just above the fetlock joint, so that interference with the innervation of the blood vessels at the seat of "speedy-cut" is impossible. However, it may be possible that the blood in the veins is dammed back upon the tendon, both in the region of the phalangeal articulations and near the check tendon of the perforans, causing a gradual venous dilatation below these points. Yet such a hyperemia, being only venous in character, could not have nearly the influence on nutrition of tissue that an arterial hyperemia would have, and the latter occurs only peripherally to the point of section of the nerve. Therefore, no cause for bruised tendon remains except the mechanical cause, *i. e.*, the flexor apparatus following neurectomy does excessive work.

There is sometimes observed after neurectomy a gradually increasing swelling of the cutis and subcutis over the coronet, heels, in the fold of the fetlock and about the long pastern, and often, indeed, a dropical condition of the great sesamoid sheath of the perforatus and perforans tendons. Möller designates this a *hyperplasia*, while Williams compares this condition with *white swelling* (*tumor albus*) of man, and assumes that it is the cause of rupture of the tendon.

In my opinion, based upon an anatomo-pathological investigation, we have here to deal neither with a neoplasm in the

above mentioned tissues nor with hyperplasia nor with that morbid process of the articulations of man known as tumor albus, but rather with simple infiltration and edema of peripheral parts caused by hyperemia resulting from neurotomy. This statement is substantiated by the fact that these swellings often pass entirely away. They should not be considered in any sense as contra-indicating neurectomy, since, on the one hand, they do not often follow it, and on the other, it is still more rare that they pass on to ulceration or other suppurative process.

One sequel of neurectomy whose etiology is but partially understood is the casting or shedding of the hoof ("ausschuhnen"). This casting off of the horn capsule occurs:

1. Without any inflammatory, gangrenous or suppurative processes in the horn-producing tissues of the foot, and (2) not as a consequence of these processes. In what manner there can be loss of the hoof following neurectomy without disease processes in the soft tissues of the foot is a pretty obscure question. It is a fact that the horn capsule is sometimes cast off, leaving a horn matrix, which shows absolutely no pathological change whatever. Perhaps histological changes, at present unknown, are produced by mechanical shock and play a part, the cause being, therefore, external.

If we study analogous processes in the horny structures of the skin, the causes of which processes are known, we shall be forced to admit, I think, that in the loss of the hoof after neurectomy, the mechanical cause deserves more attention than any in which micro-organisms play an important part. In man we frequently see a pinching of the matrix of a finger or toenail, followed by casting off of the nail, even when there has not been the minutest rupture of a visible blood-vessel nor bruising nor tearing of the nail bed. In these cases there is an entire absence of every inflammatory process, so that only the mechanical agent can be made accountable.

Not infrequently we see that oxen with horns growing in a lateral direction from the head and comparatively straight, by falling upon the point of the horn, or by striking it against a hard body, as the side of the stall, loosen the horn immediately without producing either hemorrhage or fracture of the horn core. In such cases the horn can be slipped from its bed, as a finger of a glove from the finger. The conditions necessary to

this loosening of the horn are, of course, that the horn be tolerably straight, directed laterally, and that the blow be received upon the point of the horn and in the direction of its long axis. In such a case none but a mechanical cause can be entertained.

Finally, I may say that a case is known to me in which a horse suddenly lost the hoofs of both fore feet. An examination of the feet after slaughter of the animal failed to reveal either the presence of any inflammatory process, or of traces of neurectomy; the owner, indeed, was not acquainted with the operation, and the only information as to the probable cause of the mishap that I could get was that the horse had just finished an unusually long drive over a hard public road. This case will permit of no explanation other than that as a result of long continued mechanical insults, a separation finally occurred between the horn and its matrix. In the cases just enumerated, the separation of horn from its matrix occurred while the latter enjoyed perfect innervation and apparently as a result of mechanical influences.

The conditions are entirely different, however, in a foot after a neurectomy; there will be found a more active production of horn consequent upon the section of vaso-motor nerves, the hyperemia and hypernutrition. The epithelial cells are, in fact, produced so rapidly upon the surface of the keratogenous membranes that they do not have time to harden and become horny before they are displaced by younger cells forming beneath them. This layer of soft cells (rete mucosa) becomes, therefore, thicker and less tenacious than under normal conditions and weakens the union of horn and matrix. That a hoof in such a weakened state should come away after repeated mechanical insults is not difficult to believe. However, it still remains to be shown why this loss of the hoof does not happen to all neurectomized horses. Perhaps a careful examination would throw light on this point.

The destruction of all feeling in the foot by neurectomy is a disadvantage that frequently favors serious complications and may lead to an entire loss of the animal's working value. While horses that have not been "nerved" give evidence of the pain caused by disease in the foot, this manifestation ceases as soon as the operation is performed. Indeed, there may be in the foot, corns, prick wounds, or a close-driven nail,

penetrating street nail, suppuration, etc., even fracture of phalanges and rupture of tendon, and yet the animal not feel it, and therefore give no outward sign or indication of the trouble. Not until the pathological process is discovered by the attendant's or owner's eye is its presence in the hoof even suspected. Unfortunately, the knowledge comes usually so late that little can be done, because the morbid process has become too extensive to be checked. It may be here remarked that in the absence of nerve influence all disease processes take on a more destructive character; even chronic conditions become quickened and finally acute.

[To be continued.]

ANIMAL DIPHTHERIA.¹

BY DR. LÉON GALLEZ.

[TRANSLATED BY DR. S. J. J. HARGER.]

[Continued.]

Symptomatology.

A. DIPHTHERIA IN BIRDS.²

There exists in birds a very contagious epizoötic disease known by laymen under the names *yellow thrush*, *chancre*, *quinsy*, etc. It presents itself in two chief forms ordinarily combined in the same subject: (1) A pseudo-membranous form, characterized by false membranes of a more or less dark yellowish white color, covering one or more of the following organs: nasal cavities, tongue, pharynx, larynx, air-sacs, esophagus, crop and intestines; (2) a tubercular form, characterized by a yellow, spherical, caseo-granular production which is developed in the parenchymatous organs, in the cellular tissue in the walls of the intestines, under the skin, and in the orbit. These tubercles have exactly the same structure as the false membranes, and in them is found a special parasite, a *psorosperm*.

This disease having anatomical lesions analogous both to tuberculosis and to diphtheria has been known under the name

¹ *Bulletin de l'Académie royale de médecine*, 1895, p. 494.

² Mégnin, "Maladies des oiseaux," Paris, 1880, p. 121.

tuberculo-diphtheria of birds and poultry. The researches of Mégnin and Cornil tend to establish the fact that the etiology of these two lesions is not the same.

We can therefore recognize in the diphtheria of birds two forms essentially differing as to their nature, though they may exist in one animal at the same time: (A) a croupo-diphtheritic inflammation of the mucous membranes, very probably of microbic origin; (B) a croupo-diphtheritic inflammation produced by the *gregarina*.

The former has special anatomo-pathological characters; besides, in spite of its contagiousness, it is only with difficulty transmitted by inoculation; on the contrary, the gregarinous diphtheria is readily transmitted in this manner.

I. The first form, the *microbic*, constitutes, next to chicken cholera, the most virulent of the epizoötic diseases of the avian species. It affects in preference Italian and French chickens and pigeons. Dr. Stevens, of Tournai, a member of the Provincial Medical Commission of the Hainaut, after numerous inquiries in reference to epizoötics of diphtheria in birds has arrived at the conclusion that in the majority of cases in which the avian origin of the disease was evident, the contaminating birds were Italian hens or game cocks; infection from pigeons, according to this authority, is much more rare.

Young birds, more than adults, are predisposed to contract the disease which is also seen in palimpeds and in parrots.

The symptoms which are very irregular, depend upon the seat of the disease; only one region may be affected or the disease may involve a number of organs simultaneously.

Freidberger and Fröhner give the following description:

The symptoms develop slowly and indicate an alteration in the general nutrition of the animal.

I. *Diphtheria of the Mouth and Pharynx*.—At first this localization of the disease may pass unnoticed, but soon a hyperemia and a slight tumefaction of the affected mucous membrane may be observed. Then, and sometimes in twenty-four hours, the latter is covered with an exudate resembling hoar-frost, which rapidly becomes thick, more resisting, shining and caseous; subsequently it assumes the character of a pseudo-membrane of a dirty yellow coloration, then brownish, and of a dry and friable consistency; later, its surface becomes irregular and cracked. The false membranes preferably select the hard and

the soft palate, the inferior face, the fraenum and the point of the tongue, the commissures of the lips, the cheeks and the superior part of the larynx. From the angle of the mouth the disease sometimes spreads to the external integument.

The recent diphtheritic exudates adhere strongly to the subjacent mucous membrane; when raised, there is seen a more or less deep ulcerating wound, irregular, reddish, bleeding, whose borders are worm-eaten and its bottom is granular and studded with small villosities. The deep layer of these membranes is penetrated by loops of blood-vessels, and often, when torn away, the vessels are ruptured and give a small hemorrhage. At a more advanced period these exudates may become detached; the mucous membrane here is sometimes intact and sometimes it presents numerous chancrous ulcerations, loss of tissue from sloughing and even necrosis in certain regions. This is the *diphtheritic pip* (chancre, yellow thrush, scurvy) which it is not necessary to confound with the simple inflammatory pip. The animal affected breathes through the beak from which escapes a viscid secretion that is picked off by, and inoculates, the others. They gape frequently, refuse to eat and avoid liquids. All the gallinaceous birds make a hoarse sound during expectoration.¹

2. *Diphtheria of the Mucous Membrane of the Nasal Fossae and the Nasal Sinuses.*—In the first stage, there is a serous discharge from the nose, which afterward becomes viscid and dirty yellow. When dessicated it partially obstructs the nostrils and nasal fossae; respiration becomes difficult, sneezing frequent and followed by the expulsion of a mucous secretion; the palatine fissure is sometimes filled with the diphtheritic production. Very often the disease spreads to the membrane covering the intra-ocular sinus. Above the internal angle of the eye and behind the base of the beak the soft tissues are swollen, hyperthermic and edematous; there is a small discharge on the corresponding side. This swelling augments and extends upon and posterior to the ocular globe, and finally it may reach one-half of the volume of a walnut. The corresponding palatine bone is hypertrophied, especially in a transverse sense, and projects freely into the cavity of the mouth; at a more advanced period, the infra-ocular region is tensed

¹ Léniez, Loc. cit. Galtier, "Taité des maladies contagieuses et de police sanitaire des animaux domestiques," second édit., Vol. II, 1892, p. 802.

and hard. When explored, there is found here a thick, whitish, creamy liquid with soft, yellowish, caseous masses; still later, the contents is dry and granular and sometimes is disposed in thin concentric layers; at other times, it forms more or less voluminous blocks. It may become very abundant and dilate the sinus to two or four centimetres in diameter. The adjoining soft tissues are compressed, the eyeball is prominent, the palate bulging, the bones depressed and the head deformed. The animal can close the beak only with difficulty and is scarcely able to take any nourishment.

3. *Diphtheria of the Larynx and Trachea.*—Diphtheritic lesions often exist in the trachea, the larynx and the tissues surrounding them: Dyspnea is more or less intense according to the thickness of the false membranes and the degree of obstruction of the larynx; the respiration is deep, painful and sometimes labored; the mouth is widely open; the respiratory sound is sibilant, stertorous and accompanied by moist râles and a cough. The expectorated exudate accumulates in the pharynx, is then ejected through the beak and soils the anterior part of the body. Death may supervene from asphyxia.

4. *Ocular Diphtheria.*—This form of diphtheria commences with symptoms of a conjunctival phlegmasia, followed immediately by a muco-purulent catarrh; the eyelids and neighboring tissues are hot and edematous, the lids are adherent by their free borders and, when separated, a serous, purulent or caseous inflammatory product is discharged, the discharge being moulded upon the ocular globe and presenting a lenticular or semi-lunar form.

When the disease is allowed to progress without intervention, the eye becomes atrophied under the permanent pressure of the exudate, or is invaded by the diphtheritic process, which quickly produces a grave loss of tissue.

From the sclerotic coat the phlegmasia extends to the cornea, which becomes cloudy, edematous (parenchymatous keratitis), and is often covered by an exudate of a conical form rapidly augmenting in thickness and separating the eyelids; the cornea suppurates and is perforated. In most instances a panophthalmia is developed, which rapidly terminates in atrophy of the eyeball.

5. *Intestinal Diphtheria.*—This form occasions a more or less intense catarrhal inflammation and a strong infiltration of

the mucous membrane. It generally makes its progress slowly. Preceded by other localizations, it is the last stage of this diseased process. The diarrhea is fetid, serous, mucous, purulent or hemorrhagic; the general phenomena of the disease are aggravated. The intestinal flux is followed by insensibility, apathy and emaciation, and when it is excessive, death follows.

6. *Cutaneous Diphtheria*.—Extension to the skin is seen around the natural openings. Ulceration and sloughing of the integument are seen in these regions. Tubercular new-formations of the skin belong to the gregarinous form of diphtheria.

The *course* of avian diphtheria is quite slow and death follows at the end of several weeks or even several months. Chickens and pigeons die much more rapidly.

The *prognosis* is very grave, the mortality being from 50 to 70 per cent. It is ordinarily difficult to effect a recovery. Very often a cure is only apparent and the morbid centres continue to exist. It can thus be understood that many animals which appeared cured are mixed with the healthy and infect the latter.

II. *Diphtheritic Inflammation of the Mucous Membranes Produced by Gregarina*.—This is the *second form* of avian diphtheria. The gregarina or psorosperma (*occidia*, when they are encysted), are a very small element consisting of a protoplasmic corpuscle. The diphtheritic process from these parasites is distinguished from the microbic diphtheritic inflammation by its frequent extension upon the skin of the head, its positive results which inoculations constantly give and its relative easy curability.

Upon the mucous membranes of the head, the clinical characters are similar to those of microbic diphtheria. The diseased process consists essentially of a specific phlegmasia of the mucous membrane of the mouth, pharynx, nasal fossæ, the eye, etc., accompanied by a secondary intestinal lesion.

But this form of diphtheria differentiates itself from the microbic variety by the frequency of alterations upon the skin, and especially by the appearance upon its surface of tubercle-vegetations to which has been given the name *gregarinous epitheliomata*, identical with the *molluscum contagiosum* of man. This epithelioma is developed in preference upon the head and other regions deprived of feathers; they are at first flattened

tubercles, but afterward become more prominent. Their volume at first is that of a poppy or millet seed and of a light red or grayish-yellow tint; they are hard to the touch and their surface is rapidly covered with a reddish or yellowish brown, dirty-gray crust. They are variable in number and develop upon diverse regions, especially upon erectile organs; their dimensions vary with their age.

When these pseudo-tubercles are developed upon the eyelids, the latter are infiltrated, thickened and are glutinated; the conjunctiva is often tumefied, projecting between the palpebral valves and presenting, during the first stages, signs of a catarrhal inflammation. At the points where the eruption exists it has a yellowish color and is covered with the dried exudation.

Later on, the phlegmasia becomes purulent, and if it spreads upon the cornea and the sclerotic, the result is a keratitis and a panophthalmia; when the disease also involves the external integument of the eyelid and the surrounding regions (this is seen in pigeons), the entire eye becomes covered with a more or less large neoformation having an aspect like a myrtle bean.

The *prognosis* in this form of diphtheria is less serious than in the microbic variety.

Such are the principal features in the symptomatology of diphtheria in birds. Let us add, for the sake of completeness, that Léniez has frequently observed paraplegia, the lameness may be in one foot or in both. In either case, he has seen epileptic symptoms, and Méguin has cited a similar observation.

Diphtheria presents the same characters in the sparrow, canary, finch, goldfinch, greenfinch, pigeon, turkey and pheasant. According to Léniez, turkeys offer the greatest resistance to the disease, because they are robust and can survive for a long time, grave alterations in the organs, but at the same time they can disseminate the contagion among other animals.

An interesting fact of observation to be mentioned in reference to the paralysis in pigeons consecutive to diphtheria is that proprietors of homing pigeons do not hesitate to sacrifice those animals when affected with the disease, because even if they recover they have lost their value. Their flight is not only diminished in speed, but their endurance also is impaired.

B. DIPHThERIA IN CALVES.

Dammann¹ has under this name described a diphtheritic inflammation of the mucous membrane of the mouth and pharynx observed in calves and lambs. This disease presents a marked analogy to the diphtheritic form of stomatitis and pharyngitis, as well as with aphthous fever. Dammann admits the identity of vitulary and human diphtheria; after this author, the disease is contagious and inoculable to the lamb and the rabbit and transmissible to man; it affects the calf during the first week of suckling. The period of incubation is very short, from one to three days, sometimes longer, and the virus preserves its vitality for a long time.

The diphtheria of bovine animals is ushered in by general symptoms with a more or less pronounced fever. The symptoms furnished by the digestive apparatus may be very variable. When the disease is grave, there always is inappetency and salivation more abundant than in a state of health. The mouth is sometimes widely open and allows the protrusion of the tongue which is always tumefied; in these cases the anterior portion of the respiratory tract also is diseased and the inspiration of air is painful. The buccal, labial, lingual, palatine and pharyngeal mucous membranes also are congested, swollen, tumefied, reddish and cyanosed. They are covered, in places, with whitish, yellowish or grayish false membranes more or less adherent; the mucous membranes sometimes also show veritable erosions where the false membrane has become detached and left the derm denuded. The tongue, soft palate and tonsils are swollen. On the exterior there is a tumefaction of the head, throat and neck from a more or less considerable infiltration of the subcutaneous connective tissue, and it follows then that deglutition and respiration are performed with difficulty.

Frequently symptoms of diphtheritic enteritis are observed, which is preceded by constipation and then followed by a diarrhea that often really becomes a dysentery.

Localizations of the disease upon the respiratory organs are very frequent. They manifest themselves upon the pituitary, laryngeal, tracheal, bronchial mucous membranes in the lungs, and sometimes even upon the pleura and the pericardium.

¹ Dammann, *Deutsche Zeitschrift für Thiermed.*, 1877.

The disease may invade all of these organs successively or simultaneously, but most frequently it is limited to the mucous membrane of the larynx, trachea and lungs. The dyspnea is more or less pronounced and during inspiration a whistling sound is emitted by the passage of the air through the constricted lumen of the respiratory passages. The physiognomy of the animal is distressed by the impediment in the respirations. In addition to these symptoms there is a yellow, serous or pseudo-purulent discharge from the nostrils and a cough. Auscultation of the larynx reveals a gargling laryngeal sound, called the *croupal râle*.

False membranes are also seen upon the conjunctiva and sometimes upon the cornea. Wounds of the skin of the diseased are very often covered with false membranes.

The *prognosis* of diphtheria in the bovines is very grave. The disease being very contagious and often fatal, the consumption of the meat of animals so affected is proscribed.¹

C. DIPHThERIA IN SHEEP.

We have seen that, according to Dammann, diphtheria of calves is transmissible to lambs. Roche-Lubin² has described under the name *bronchial croup of wool-producing animals* a disease which exclusively attacks lambs from two months to one year of age during springtime and summer and is refractory to any method of treatment. The symptoms are as follows: The first day constant movements of the jaws, extreme tension of the neck, and abundant salivation are observed; the respirations are jerking and sibilant; slight pressure applied to the neck makes suffocation imminent; the animal refuses all food. The second day there is great distress, the pulse is feeble and accelerated and a whistling râle is heard during respiration; the cough is abortive and followed by a whitish, viscid discharge from the nostrils.

The third and fourth day, the mouth is open, the mucous membrane ecchymosed, moist bronchial râles, spasmodic cough, and a homogeneous, albuminous discharge escapes from the mouth and the nostrils; finally, asphyxia follows during a violent paroxysm of coughing.

¹ Galtier, Loc. cit., Vol. II., p. 810.

² Roche-Lubin, *Annales de Méd. Vét.*, 1851, p. 652.

The autopsy of the animal shows that the bronchial mucous membrane is covered with false membranes.

D. DIPHTHERIA IN DOGS AND HORSES.

Robertson¹ has seen dogs and horses suffering from diphtheria simultaneously, its spreading to others and its disappearance occurring at the same time. He designates as *diphtheria* the specific, contagious disease of the throat, accompanied by organic trouble and having the lesions of laryngeal croup. The mortality has been high.

In the *horse*, the disease is manifested by a refusal to take liquids or by difficulty of deglutition ; he pushes the nose into the water, attempts to swallow, but suddenly stops, or the water may escape from the nostrils. The animal sometimes trembles, but not from the cough, excepting when he attempts to swallow ; the glands of the throat are enlarged ; the temperature remains elevated and continues to increase until death ; the pulse is very rapid, small and feeble ; the respirations are noisy.

The autopsy reveals a marked obstruction in the larynx and the trachea. In two cases death occurred inside of forty-eight hours, in the others in five days.

Small dogs were affected and died before the others became diseased. The urine was albuminous, the fever high and death rapid from the extension of the disease into the larynx. At other times the symptoms were more marked. In all cases, whatever has been the intensity of the symptoms, the cervical and pharyngeal glands and the surrounding tissues were infiltrated. Finally, other cases presented the *nasal* type : Fever, pharyngitis, sanguinous discharge from the nose, fetid breath and considerable enlargement of the lymphatic glands. This form had a longer duration than the preceding.

[To be continued.]

CLITORIDECTOMY.

Cadiot classifies the cases of removal of the ovaries in the mare and cow in the treatment of nymphomania into three general groups, according to the therapeutic results obtained. In a certain number of these observations, the cure has been

¹ *Veterinary Record*, August, 1875.

complete ; in others, there is only an amelioration of the symptoms more or less marked ; in others again, the genetic desires, the morbid irritability, the inveterate biting and kicking, etc., have continued without any notable change. By comparing the cases which he has collected since 1888, he has found that the percentage for these three categories is almost equal ; about one-third are cured, one-third ameliorated and one-third unsuccessful.

It is certain that the operation may be unsuccessful, even in cases in which the morbid condition that we expect to remedy is connected with the genital apparatus. Delafond had already practiced cauterization as well as excision of the clitoris in "hysterical" mares and cows. Weber also has had experience in ablation of the ovaries and resection of the clitoris without the least advantage.

The persistence of the nymphomania with all its characters and all its conveniences in some of the spayed females is due to a variety of causes, but one is inclined to believe that it is often the clitoris which plays the principal rôle in this persistence. Proof of this may be borrowed by studying some examples in human surgery. It is a well known experience that in some women in whom the ovaries have been removed, the venereal desires continue and that in them the sexual act is performed with pleasure. If in the absence of the ovaries the clitoris preserves its functional attributes, it can evidently also, in the same conditions, be the seat of hyperexcitability or morbid irritability, and in the large females affected with nymphomania the chances of success are greater if both the ovaries and the clitoris are removed at the same time than when only the former are excised.

Encouraged by Dr. Hollingsworth's case of removal of the clitoris, reported in the VETERINARY MAGAZINE, Cadiot operated on June 5 on a "pissy" mare, which for some time was useless and unmanageable. He made a simple excision of the clitoris, and after the fourth day a decided change in the disposition of the animal was apparent.

He believes that clitoridectomy performed at the same time as the removal of the ovaries will increase the number of successful cases in the surgical treatment of nymphomania.

The manual of operation is simple. Excision of the clitoris is preferable to removal with the thermo-cautery.

Sanson, basing his opinion upon the work of Mansuy, does not doubt the efficacy of ovariotomy. If the excision of the clitoris is effective, it is evidently the more advantageous, since the animal can be used for breeding purposes afterwards.

Weber knew of a case, a mare, in which the nymphomanic symptoms disappeared only to reappear as severely as before the operation three months afterwards.

Nocard does not expect this treatment to be successful in such cases in which the symptoms are due merely to a special nervous excitability.

Trasbot has had variable results in spaying the mare. He has performed the operation quite often; in some the results were successful; in numerous other instances the condition of the patient was not modified.—*Recueil de Méd. Vét.*, June, 1895.

CLINICAL REPORTS.

A CASE OF RUPTURE OF THE BLADDER IN THE HORSE DUE TO TRAUMATISM.

Under date of July 24, I was called to visit a mare about two miles away. Upon learning the history, I found that the animal had done no unusual amount of work the previous day. During the night the halter-shank which passed through a hole in the manger had become untied, allowing the animal to back partly out of the stall; a knot in the end of the rope failed to pass through and prevented the entire freedom of the animal which backed partly out of the stall and turned completely around with the posterior parts toward the manger. When found in the morning, the posterior quarters were under the manger and the animal struggled violently to get upon her feet. The owner, with assistance, freed the animal from her fastening and assisted her to rise. She was quite weak, trembled and even fell to the ground.

On examination I found the animal lying quietly on the left side with bruises on both sides of the head and thorax; the lumbar and sacral muscles badly bruised and the skin slightly lacerated from attempting to free herself in the stall; the eye dull, nasal and buccal mucous membrane pale; pulse thirty-eight and weak; respirations normal; temperature 101.2° F.; anus and vagina swollen and protruding.

Rectal examination: muscles partially paralyzed, colon greatly inflamed, forced well back and quite tender; ovaries and kidneys tender; bladder partially collapsed and very tender; visible mucous membranes discolored with coagulated blood.

Vaginal examination: animal evinced much pain while examining; muscles of vulva partially paralyzed, bladder partially collapsed and quite tender. On drawing the urine, I found but a small quantity which was flocculent; no noticeable pain on abdominal pressure.

Second visit, which was made two days later: Found that the animal had been killed a few hours previously.

Autopsy.—Upon opening the abdominal walls, I found a copious flow of a yellow-colored liquid with a uriniferous odor; all organs anterior to the kidney apparently normal; kidney and ovaries slightly inflamed; the surrounding connective tissue filled with a serous exudate; ureters slightly inflamed; bladder partially collapsed; broad ligament slightly ruptured at several places; all loose connective tissue in this region filled with serous exudate; vaginal walls greatly inflamed; bladder greatly inflamed and showing a *rupture* large enough to admit the index and second finger without difficulty, a short distance from its entrance into the vagina. No noticeable lesions of psoas or other muscles.

WILLIAM B. KILLE.

Woodstown, N. J.

NATURAL RECOVERY OF A CASE OF ROARING.

A friend of mine purchased a valuable stallion about six years of age, record 2.25, during the winter of 1893. About the twenty-fifth of March, 1894, he placed him in the hands of a trainer. The horse had not been in the trainer's care longer than a week when he commenced to show signs of sickness, and in the course of a few days a violent pneumonia developed. This was probably caused by the change from a warm well-sheltered barn where he had been all winter to a thin shell of a box on top of a hill.

Fortunately for both owner and horse, the latter recovered in about six weeks, but he was an awful looking wreck. A couple of weeks after the danger line was passed and the horse was convalescing rapidly, the owner was discussing with a few friends his future, and he wound up the conversation by remarking that he would have the horse in harness by the following July. He sent him to the track in the early part of July, 1894, and the horse really did look fit to all outward appearances.

After he had been at the track about five weeks, the owner ordered the trainer to speed him. The consequence was the horse developed another attack of sickness. What the diagnosis was I cannot say, but upon inquiry of owner, he said that his blood was out of order and his body was covered with small round pimples, and the result was that the horse was laid up

about four weeks, and when they started in training him again it was found that (using horsemen's language) he was thick in the wind. This continued and grew worse; in fact, when started up to a fast clip he was a pronounced roarer. He was kept in training for some length of time, being driven with hood and neck sweater, the owner claiming that it was only a thickening of the glands in the neck and that it could be sweated out; but such was not the case, he grew no better, so the horse was brought home and sent to a farm in October, where he remained until this spring. About the middle of May of present year he had the horse brought in and after a few days sent to track. About the latter part of last month (July) he trotted three miles in better than 2.25 without the least sign of a noise of any kind and finished strong in each and every mile. This I think a wonderful change from the form exhibited the year previous.

J. BEATTY, *Student.*

Philadelphia, August 17, 1895.

ABSTRACTS.

EXCEPTIONAL GESTATION.

A St. Bernard bitch belonging to a farmer in Hesse, Prussia, gave birth to *nineteen pups*, *only one being dead* at the time of parturition. Fifteen were left with the mother. They are also fed artificially with milk, and both mother and young are thriving.—*La Nature*.

ANTISEPTIC DRINK FOR CATTLE (PASZOTTA).

Lysal	70 parts.
Spirit of spearmint	50 "
Water	300 "

Give a tablespoonful three times daily in a quart of water.

—*Ann. Théráp. de Bass*, 1894.

ANTISEPTIC POWDER FOR WOUNDS (GEIGER).

Aristol	6 grams.
Sub-gallate of bismuth (dermatol)	8 "
Acetanilid	30 "

This powder, absolutely odorless, is recommended as a good cicatrizing antiseptic, to be employed especially in non-infected wounds.—*Jour. de Méd. Vét. et de Zootech.*, July, 1895.

MIXTURE FOR WARTS (KAPSI).

Flowers of sulphur	10 grams.
Glycerin	25 "
Pure acetic acid	5 "

Shake before using.

This mixture is applied daily. The excrescence diminishes in size, dries little by little, and finally drops off.—*Union pharm.*, 1895.

PURGATIVE FOR THE DOG (BAUM).

Colocynth	0.25 gram.
Alcohol	
Glycerin, aa	35 "

One dose suffices for a small dog. For large dogs a second dose must be repeated in two hours.—*Annuaire Théráp. de Bass*, 1894.

FECUNDITY AND LONGEVITY.

Trasbot reports a remarkable case of fecundity in a very old mare. The animal is a thoroughbred mare, thirty-six years of age. In 1893 she was accidentally covered by a two-year old colt, but afterward aborted. Last year she was stunted to a stallion and gave birth to a well-developed foal which was nourished with her own milk.—*Rec. de Méd. Vét.*, June, 1895.

SULPHONAL IN NYMPHOMANIA IN THE MARE.

Gotteswinter administered sulphonal to a "pissy" mare which was very dangerous, absolutely dangerous, and had resisted all means of medical treatment. The drug was continued for three days, 100 grams being given daily. There was such an amelioration of the symptoms that the animal could be used without any difficulty.—*Wochenschrift für Thierheilkunde*.

DERMOID CYST UNDER THE SHOULDER IN THE OX.

Moulé and Guerrin observed a dermoid cyst between the scapula and the side of the thorax. It consisted of a closed sac, ovoid in shape, 15 cm. long and 7 cm. wide, and terminating by a prolongation 20 cm. in length, which extended toward the scapulo-humeral articulation. The cavity was filled with hairs matted together by dry sebaceous material.—*Jour. de Méd. Vét. et de Zootech*, June, 1895.

EMULSION OF CASTOR OIL (KLEIN).

In order to avoid the nausea and vomiting which sometimes follow the administration of castor oil, the following prescription, recommended in man, may be used with advantage in

the smaller animals: Fifteen to twenty grams of castor oil are poured into a glass of milk; the mixture is heated and stirred with a spoon. In some minutes a perfect emulsion is obtained which can be sweetened with syrup of orange.

The oil administered in this way acts in smaller doses than when given in a raw state, and has lost all of its peculiar disagreeable taste.—*Bulletin méd. de Paris.*

EPIDEMIC OF ASCARIDES OBSERVED IN HORSES FROM PEAT MOSS.

In a stable of 500 horses, more than one-half had the intestines filled with ascarides; at the autopsy of some of the horses which died from colic, hundreds of the parasite were found.

These horses, which had been or were affected with sarcoptic mange, were in poor condition and predisposed to the effects of the parasite. The litter was composed of peat moss, in which Raillet found the eggs of the parasite. This was the source of infection. Change in and frequent renewal of the litter, with the administration of arsenious acid gave satisfying results.

Lavalard stated that the compagnie omnibus généralé has used peat moss in their stable for fourteen years without ever observing such an epidemic.—*Jour. de Méd. Vét. et de Zootech.*, June, 1895.

PRECAUTIONS FOR THE PRESERVATION OF YELLOW OXIDE OF MERCURY OINTMENT.

According to Holth, a Norwegian ophthalmologist, the ointment of yellow precipitate, employed in diseases of the eye, rapidly loses its therapeutic properties from the decomposition of the oxide of mercury under the influence of light. He recommends its preservation in jars that are absolutely opaque ; also the employment of excipients which do not become rancid.

The following formula is recommended: •

Lanoline

Liquid paraffine, aa 3 grams

Distilled water, boiled and filtered 1 " "

—*Jour. de Méd. Vét. et de Zootech.* July 1895.

INTERMITTENT EPISTAXIS IN A MARE.

FROM THROMBOSIS AND ULCERATION OF THE RIGHT INTERNAL MAXILLARY ARTERY IN CONSEQUENCE OF PARIETAL ENDOCARDITIS OF THE LEFT VENTRICLE.

Cadéac at the autopsy found the following lesions in a mare which suffered from repeated attacks of epistaxis: the guttural pouches, filled with black, coagulated blood of a fetid odor, communicated with each other through a triangular opening. On the surface of the right pouch were two ulcerations covered with a black or greenish scum. The right internal maxillary artery presented at about a centimetre from the point where it enters the sub-sphenoidal canal, an orifice obstructed by a rounded mass of a fibrinous nature.

In the left ventricle and toward its apex were found small, soft and friable granulations. Similar lesions were seen in the posterior aorta.—*Revue Vétérinaire*, June, 1894.

MYCOSIS ASPERGILLUS IN THE HORSE.

Thory and Lucet (*Recueil*) have made an observation of this parasite in the horse, so rarely seen in this animal. The subject of this communication was infected by contact with the litter composed of damp and mouldy straw.

The symptoms may be compared with those of typhoid affections: general muscular tremors, extreme prostration, bloody nasal discharge, rapid pulse and respirations, tumultuous heart beats, temperature 41° C. The second day, local symptoms of infectious pneumonia and nephritis appeared.

Death took place on the third day.

The essential and only lesion was a generalized interstitial hemorrhagic infiltration. The lungs, pleura and heart were covered with dark, hemorrhagic spots. The lungs presented here and there blood-stained, hepatized centres as large as a hen's egg. The mucous membrane of the intestines and the kidneys showed the same hemorrhagic alterations. The liver was normal.

Histological examination and cultures have demonstrated in all the lesions the presence of the *aspergillus fungatus*.—*Jour. de Méd. Vét. et de Zootech.*, June, 1895.

TYPHOID FEVER FROM INFECTIVE MILK.

The most severe epidemic of typhoid fever of which there is any record in Connecticut, is now in progress in Stamford. Thus far more than two hundred cases have occurred in a town of about 18,000 inhabitants. Careful investigation of its origin is being made and in due time will be published. The evidence at present seems conclusive that the disease was spread from infected milk, and that the milk became infected by washing the milk cans with water from a highly polluted well. How the special infection got into the well has not been definitely determined, but the close proximity of two privy vaults is very suggestive.

There could not be a more convincing illustration of the importance of some authoritative supervision of the ways and methods of milk production for public use. So long ago as 1881, fifty typhoid epidemics from infected milk had been traced, in England, and now all English dairies are subject to the supervision and control, in a sanitary sense, of health officials.—*Sanitary Inspector.*

COMPARATIVE RESEARCHES UPON THE ACTION
OF MALLEIN AND OTHER BACTERIDIAN
PROTEIDS.

Schattenfroh has quite recently published a series of experiments upon the guinea pig from which he has concluded that mallein does not have a specific action upon glandered horses, but that it acts more strongly upon these than upon healthy horses, and is more efficacious than other toxines.

Besides the two toxines employed by Schattenfroh, that of the bacillus pyocyaneus and of the pneumo-bacillus of Friedländer, Schindelka also used tuberculine. He has compared their action with that of mallein in four horses, two steers, two goats and one pig.

With mallein, one horse gave a typical reaction of 2.4° C. It was glandered and with pyocyanine (.1 gm), only showed a reaction of $.6^{\circ}$.

The three other horses gave only a very slight reaction. At the autopsy glanders was not found; one was affected with pulmonary emphysema, the second with chronic pneumonia,

and the third with a phlegmonous enlargement of a posterior member. In these three horses, not glandered, injections of pyocyanine and the toxin of the bacillus of Friedländer produced elevations in the temperature of 1.5, 1.8, 2.1 and 2.2° C.

In the other animals, the action of mallein was as uncertain as that of the other toxins.

None of the latter could therefore replace mallein in the diagnosis of glanders.—*Berl. Wochenschr. Jour. de Méd. Vét. et de Zootech.*, June, 1895.

[We have injected tuberculous cows with mallein, but with negative results.—ED.]

EMULSION FOR TENIA (LÉMÉRÉ).

The following preparation is given to an adult mare :

Ethereal extract of male ferm	6 grams.
Calomel	60 centigrams.
Distilled water	
Syrup of acacia, aa	16 grams.
Gum arabic q. s. to make an emulsion.	

Shake well before using.

This mixture is to be taken in one dose in the morning, the animal having been fed upon a milk diet for the preceding twenty-four or thirty-six hours.

The tenia should be expelled, without any constitutional symptoms, in thirty to thirty-five minutes after the administration of the medicine.

This prescription could be readily modified so as to be used as a tenicide in the dog :

Ethereal extract of male ferm	2 to 5 grams.
Calomel5 to 1 gram.
Distilled water	
Syrup of acacia, aa	16 grams.
Gum arabic, q. s. to make emulsion.	

—*Jour. de Méd. Vét. et de Zootech.*, July, 1895.

OPINION OF PROFESSOR SEMMER, OF DORPAT, UPON MALLEIN.

The experiments of Semmer have been made upon 952 horses, of which number 561 have given reactions of from 2 to 3.5 C. The 391 which have not reacted have remained in good health ;

some of them were destroyed but did not show any lesion of glanders. Autopsies have been made upon 157 of the horses which had reacted; two were found healthy. All the other horses, which in most instances did not present any external symptoms of glanders, showed the specific lesions of this disease. These lesions were nevertheless not well pronounced, excepting enlargement of some of the lymphatic ganglia with glandular foci in their interior, small chancres and cicatrices and thickening of the pituitary mucous membrane. In all of the horses "posted," there was a small number of recent, soft, grayish pulmonary nodules, some being caseous and calcified. Sometimes the greatest care was necessary to find these alterations. The frequency of finding the lesions so little marked in meridional Russia has led Semmer to consider this form of glanders as *benign*. The disease often recovers, but should none the less be regarded as glanders, although bacteriological researches, cultures and inoculations most often gave a negative result.

Semmer considers mallein as the surest reagent in diagnosing glanders, and capable of detecting the disease in its most pronounced as well as its most incipient forms. He believes it to be of more diagnostic value than microscopic examination, cultures or inoculations. Failures in the action of the agent are due to the modus operandi and the quantity and quality of the mallein employed. The mallein of Semmer had been prepared from cultures growing until the nutritive bouillon was exhausted. This mallein should be purer and less alterable.—*Archiv. russ.*, Vols. 3, No. 2, 1894. *Jour. de Méd. Vét. et de Zootech*, June, 1895.

INFLUENCE OF THE NERVOUS SYSTEM UPON THE FUNCTION OF THE MAMMARY GLAND.

In a series of experiments upon female goats, conducted by Mironow, the following conclusions were deduced:

Stimulation of the sephena nerve in the posterior member, isolated for a certain extent, is always followed by a considerable diminution in the quantity of milk secreted, especially when the nerve excitation is sufficiently prolonged (forty-five minutes).

At the same time the milk increases in consistency from an augmentation in the proportion of solids, and especially of butter fats.

Another series of researches is not less interesting. The author has made section of the different nerve trunks which supply the udder and has demonstrated that double section of the spermatic nerves has the most marked influence upon the lacteal secretion, which in this respect must have a very pronounced inhibitory action. Hence the conclusion that the external spermatic nerve is the principal channel through which the nerve fibres that control the secretory functions of the mammary glands pass.

Mironow has also endeavored to isolate, as completely as possible, the mammary gland from its connections with the central nervous system by making section of all the nerves and of the skin around the udder. The quantity of milk having decreased only 35 to 40 per cent, in spite of the enervation, he concluded that there exist in the gland peripheral nerve centres which preside over its secretory functions.

Finally, section of all the nerves going to the udder, one and one-half months before parturition did not interfere with establishing the milk secretion after the birth of the young.

From these results the author concluded that the excitation of the functions of the mammary gland from gestation and parturition is not dependent upon nerve reflexes, but is the consequence of chemical modifications which are produced in the organism under the influence of parturition.—*Jour. de Méd. Vét. et de Zootech*, June, 1895.

THERAPEUTIC NOTES.

TREATMENT OF ANASARCA IN THE HORSE.

Eckmeyer has employed with success hypodermic injections of a 2 per-cent solution of lysol, giving 10 grams ($2\frac{1}{2}$ drams) at each injection. Schaumkell recommends one or two daily intra-tracheal injections of from 10 to 30 grams of Lugol's solution (iodine 1, iodide of potassium 5, distilled water 100 parts). In grave cases 60 grams may be given. Schirmann applies to the edematous parts a lotion containing alum and a saturated solution of camphor and salt; he also gives the following mixture internally: iodine 5, iodide of potassium 20, and water 300 grams, one-third of which is given daily in a third of a liter of warm water. In order to combat the edema of the head, Aruch employs continued cold-water irrigation upon the head covered with a woolen cloth.—*Annuaire Thérap. de Bass*, 1894.

ESSENTIAL SIALORRHEA.

Faure was called to see a horse in which the only symptoms was an extremely abundant flow of saliva: five litres of saliva in fifteen minutes.

The flow of saliva, whose cause was unknown, was rapidly arrested by the following hypodermic injection:

Neutral sulphate of atropine	75 cm. (11 grs.)
Alcohol	10 c. c.

The next day, the subject presented signs of acute atropia poisoning, which were treated with large doses of pilocarpin given hypodermically. The animal received two grams and twenty centigrams (thirty-three grains) of pilocarpin in three injections in the course of forty-five minutes; and still he recovered!

The author is not surprised at this result. On the contrary, he considers the posology of most of the alkaloids, fixed by authors of treatises in therapeutics too small.—*Rec. de Méd Vét.*, June, 1895.

SERUM-THERAPY IN THE TREATMENT
OF CANCER.

Several rapid cures of carcinoma and sarcoma having been observed in consequence of an intercurrent erysipelas, Fchleisen and Neisser concluded to inject pure cultures of the micrococcus of erysipelas into cancerous subjects which otherwise were hopeless. They obtained some results, but their procedure was too dangerous ; in one case it produced death.

Emmerich and Scholl have endeavored to make an erysipelatous serum not containing injurious elements, especially the microbe of erysipelas. They have obtained it in the following manner : Sheep were previously injected with cultures of erysipelas ; they were then sacrificed and the blood collected in sterilized glass vessels. After a certain time, the serum was drawn off with a pipette and deprived of all the cocci of erysipelas by filtration through a Chamberland filter ; it was then collected into sterilized flasks of 10 c. c. each and preserved in a cold, dark chamber.

With this serum the authors treated various cases of cancer more or less severe. In several, they have very rapidly obtained remarkable success. By repeating these experiments more recently, they have not been able to effect a definite cure of cancer. Many points still remain to be improved upon and numerous experiments must be made before determining the exact value of this treatment.—*Jour. de Méd. Vét. et de Zootech.*, June, 1895.

PROCEEDINGS OF SOCIETIES.

KEYSTONE VETERINARY MEDICAL ASSOCIATION.

The last meeting of the Keystone Veterinary Medical Association for the session of 94-95, was held at the Runnymede Club, Lansdowne, June 11, 1895, by invitation of Dr. Rhoads, and was well attended.

In the absence of President Lintz, Dr. Bridge presided. After roll call and the reading and adoption of the minutes of the May meeting, Dr. U. S. G. Beeber, of Kutztown, was elected to membership.

Dr. John R. Hart was appointed to draft a letter to the Governor regarding appointments on the State Veterinary Medical Examining Board.

This being the last meeting of the current year, the regular routine of business and literary exercises were dispensed with and the evening devoted to general business topics and social enjoyment.

Those present were U. S. G. Beeber, J. L. Bradley, F. Bridge, A. O. Cawley, C. T. Goentner, W. H. Hoskins, J. D. Houldsworth, H. J. McClellan, B. F. Senseman and W. L. Rhoads.

After a very pleasant evening the meeting adjourned to meet at the office of Dr. W. H. Hoskins, September 17, 1895.

W. L. RHOADS,
Secretary.

PENNSYLVANIA STATE ALUMNI ASSOCIATION OF
THE AMERICAN VETERINARY COLLEGE.

The first annual meeting of the Pennsylvania State Alumni Association of the American Veterinary College was held at the Runnymede Club, Lansdowne, June 11, 1895.

In the absence of Dr. Allen (who was elected chairman at the preliminary meeting, held at the office of W. H. Hoskins, February 12), Dr. Goentner was elected chairman pro tem.

After the reading and adoption of the minutes of the February meeting, the merits of a State Alumni Association were discussed, thus bringing forth its advantages to the school and the profession, as well as to the men individually.

Officers were then nominated for the ensuing year; there being no contest, the secretary was instructed to cast the following ballot: President, W. L. Zuill, Philadelphia; First Vice-President, Charles T. Goentner, Bryn Mawr; Second Vice-President, U. S. G. Beeber, Kutztown; Secretary and Treasurer, W. L. Rhoads, Lansdowne; Executive Committee, W. H. Hoskins, Philadelphia; F. S. Allen, Philadelphia; A. O. Cawley, Milton; H. J. McClellan, Lansdowne; J. L. Bradley, Mercersburg.

The Executive Committee were instructed to draft by-laws, etc. The meeting was well attended, and after a sumptuous repast adjourned to meet at the call of the chair.

DR. W. L. RHOADS,
Secretary.

OHIO STATE BOARD OF VETERINARY EXAMINERS.

The Ohio State Veterinary Board held a meeting* on July 2, at Columbus. A number of applicants were examined. Although we have not as yet learned the results of the examination, some of the candidates, we believe, have not been successful. The committee consisted of Drs. Detmer, Meyer, Smith and Probst. The average grade must be sixty or more in order that the candidate may be successful. The following is the list of questions asked which have been placed at our command through the kindness of Professor Detmer:

1. Describe the tarsal joint of a horse.
2. Describe the digestive canal of a cow from mouth to anus.
3. Describe the structure of the liver.
4. Name and describe the cerebral nerves.
5. Describe the process of digestion in a ruminant, and state how rumination is effected.
6. Describe the circulation of the blood in the fetus.
7. Name and describe three poisonous umbelliferae, and state where they grow, and what effect they have upon herbivorous animals.
8. What is an element? Of what elements is the animal organism composed?
9. What is an organic, and what is an inorganic compound?
10. If calomel and common salt constitute the ingredients of the same medicine, what will happen, and why?
11. How would you differentiate a cataract from amaurosis?
12. What infirmities of the extremities would you look for in examining a horse for soundness?
13. Give the live-history of *tenia coenurus*.
14. Give a definition of the morbid process usually called "inflammation."
15. State and describe the characteristic morbid changes in contagious pleuro-pneumonia of cattle, *i. e.*, those of greatest diagnostic value.
16. Describe the symptoms and morbid changes of rabies in dogs.
17. Describe and explain the most frequent predisposing cause of colic in horses.
18. Describe the operation of castrating a horse with covered testicle.
19. Describe the disease known as spavin. Give the characteristic symptoms (such as are of diagnostic value), and describe the morbid changes of the various stages.
20. If in a case of obstetrics you should find all four feet of the fetus in the os of the uterus, how would you proceed to deliver the mare?
21. How would you proceed in a case of prolapsus of the uterus in a cow, if the prolapsus is a complete one?
22. How would you shoe a horse with pumiced hoofs, and how one that has a suppurating corn?

23. What is the effect of digitalis upon a horse; what constitutes a safe dose, and how often may it be repeated? Explain the principal effect.
24. How would you diagnosticate, and, after the diagnosis has been made, treat an impaction of the third stomach in a cow?
25. If at a post-mortem examination of a horse, which you have not seen during life, you find a bucketful of clear serum in the chest, what, in your opinion, is the shortest time required for such a large effusion to be produced?
26. If you are called to see a lot of sick hogs, and you find that they are all acting in the same way, are moving or running around in a circle, and evidently suffer from an affection of the brain, what, in your opinion, has probably happened, or what conclusion, naturally, would you arrive at concerning the cause?

NECROPSY.

MALFORMATION OF GENITAL ORGANS OF A CALF.

BY E. MAYHEW MICHENER.

In the early part of June I examined the carcass of a three-year-old heifer, which was one of twins. The owner informed me that this animal had never shown the least sexual appetite. The following anomalies were found: Scarcely any trace of mammary gland; external genitals small and contracted; no clitoris; vagina terminating abruptly just above the meatus urinarius; no uterus, nor trace of ovaries.

Externally the animal had a normal conformation; its habits were quiet and it fattened well, making an excellent carcass. The other twin, a bull-calf, had been killed as veal.

MISCELLANEOUS.

VETERINARY SURGEONS MUST PROVE QUALIFICATION.

A physician, surgeon or dentist, it has been said, undertakes in law to supplement his reasonable care and honest endeavors with ordinary professional skill. The same is true, according to a decision of the Supreme Court of Michigan rendered July 2, 1895, in the case of Conkey v. Carpenter, of a veterinary surgeon, because it requires education to be able to treat diseases of dumb animals as well as diseases of men. There is no presumption of qualification. A "quack," without education or experience, employed upon the representation that he is a qualified veterinary surgeon, can not recover for services. Professional employment stands upon a different basis from other businesses. It is, therefore, the common practice, when a professional man sues for services as such, to prove his qualification. This is done by showing his admission to practice under the statute, his graduation from some reputable college or school, or his study and experience, if his right to practice is not regulated by statute.

HOW TO TELL A BAD EGG.

When one calls for a fresh egg in a Parisian eating house, the chances are that one will be properly served. Not that there are no bad eggs in Paris as well as elsewhere, but there are certain men employed at the central markets or halles whose only duty is to sift the bad or doubtful eggs from the good ones. In one of the cellars of the halles one sees a man passing his hands rapidly before his eyes and in front of a lighted candle. Around him are baskets containing thousands of eggs. His duty is to separate the bad ones from the good, and he is remunerated at the rate of 75 centimes, or 15 cents, for 1000 eggs.

He accomplishes his work with extraordinary dexterity. With one hand he takes three or four eggs and brings them to the exact position he wishes between his eye and the lighted candle as if by magic. For an egg to be good the part that appears black must be completely detached from the part that appears white. In other words, the yolk and the albumen must, through the transparency of the shell, be seen to be quite separate. The white looks as if it radiates about the central nucleus, and this nucleus is simply the embryo of a chicken which, being denser, floats in the liquid which nourishes it. When there is confusion between the transparent and the obscure part, the egg is doubtful.

The men are all sworn in to do their work honestly, and with their serious and automatic look they make between \$1.50 and \$2 a day. The other employes of the halles bow down to them and are ever willing to acknowledge their scientific superiority.—*Philadelphia Times.*

DR. CH. WARDELL STILES, of the Bureau of Animal Industry, has been appointed Delegate of the United States Government and Representative of the Department of Agriculture, Smithsonian Institution and National Museum to the Third International Zoological Congress to be held at Leyden, Holland.

NECROLOGY.

Dr. William Bryden, a well and favorably known veterinarian of Boston, died there on June 28 after an illness of about thirteen months, the immediate cause of death being apoplexy. Dr. Bryden was born in Scotland, having come to this country when a boy. He was graduated from the Montreal Veterinary College (now a department of the McGill University) in 1871, where for several years he served as one of its board of examiners. He was a past president of the United States Veterinary Medical Association; also a charter member and past president of the Massachusetts Veterinary Medical Association, and an honorary member when he died. For many years he was inspector of cattle for British steamships from the port of Boston; known personally to most members of the profession throughout the country, and to others by his frequent contributions to our journals.

He will be remembered by many young practitioners as a good friend and ever ready adviser. He was a good man whom we esteemed highly, of a genial and hospitable nature, of marked intelligence, an able student and practitioner.

Dr. Bryden was well up in Masonry, and will be greatly missed by a large circle of friends and acquaintances.—E. C. BECKETT, M. D. V. *Jour. Comp. Med. and Vet. Arch.*

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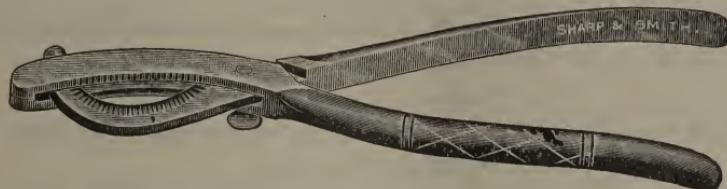
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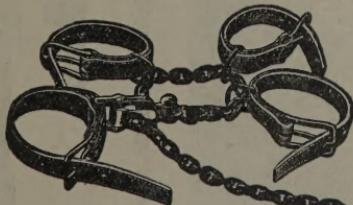
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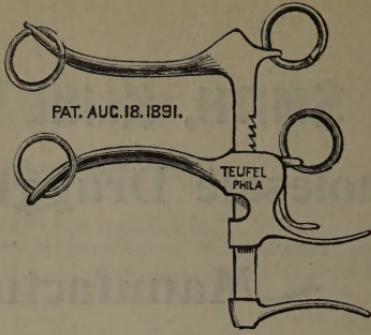
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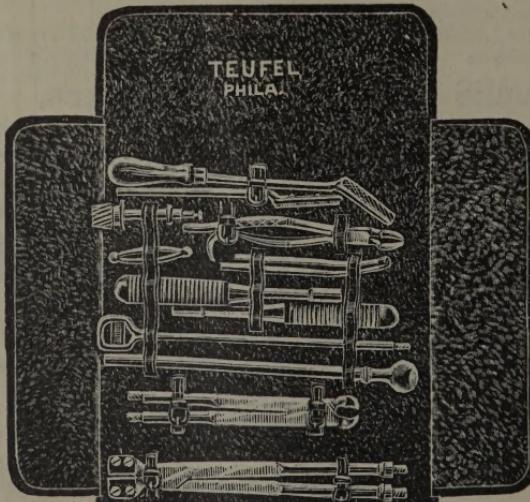
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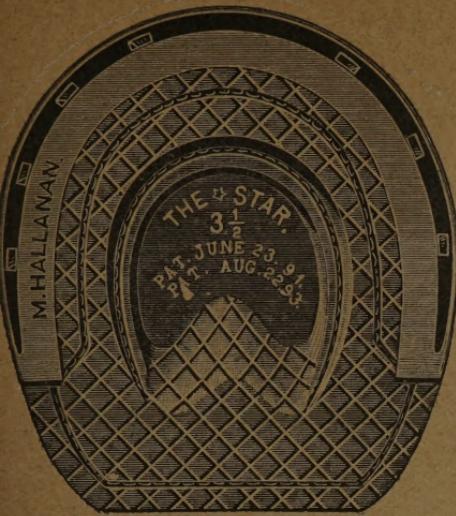


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